WHAT IS CLAIMED IS:

1. A wireless communication receiver comprising:

an antenna array comprising an antenna which provides signals for each of successive sets of pilot data;

a joint searcher and channel estimator which essentially concurrently considers the plural signals for the respective successive sets of pilot data for determining both a time of arrival and channel coefficient.

2. The apparatus of claim 1, wherein the time of arrival and the channel coefficient are essentially concurrently determined by the joint searcher and channel estimator.

3. The apparatus of claim 1, further comprising a detector which utilizes the channel coefficient and the time of arrival to provide a symbol estimate.

4. The apparatus of claim 1, wherein the wireless communication receiver is a mobile terminal.

5. The apparatus of claim 1, wherein the wireless communication receiver is a network node.

6. The apparatus of claim 1, wherein each of the sets of pilot data is represented by a pilot set index, and wherein the joint searcher and channel estimator comprises:

an antenna signal matrix in which a complex value indicative of the signal received in a sampling window is stored as a function of a sampling window time index and the pilot set index;

a correlator which uses the antenna signal matrix to generate a correlator output;

a correlator output analyzer which uses the correlator output to generate the time of arrival and the channel coefficient.

7. The apparatus of claim 6, wherein in performing the calculation the correlator considers a dimensional receptivity vector formed from the antenna signal matrix with respect to a sampling window time index for the plural sets of pilot data, the

dimensional receptivity vector having a frequency related to a difference between phase components of complex values of the dimensional receptivity vector, there being plural possible frequencies for the dimensional receptivity vector, the plural possible frequencies being represented by a frequency index; and

wherein for each combination of plural possible frequencies and plural time indexes, the correlator calculates:

$$Y(n,t) = FFT(n,X(:,t))$$

wherein t is the sampling window time index;

$X(:,t)$ is the complex antenna matrix; and

n is the frequency index.

8. The apparatus of claim 7, wherein for each combination of plural possible frequencies and plural time indexes, the correlator calculates:

$$Y(n,t) = \Sigma\, C_j * FFT(n,X(:,t)),\ j = 1,K$$

wherein C_j is a coding sequence symbol value j and K is a length of the coding sequence.

9. The apparatus of 7, wherein each of the plural possible frequencies corresponds to a doppler shift.

10. The apparatus of 9, wherein the correlator output comprises $Y(n,t)$, and wherein the analyzer determines a maximum absolute value $|Y(n,t)|_{max}$, wherein the analyzer uses a sampling window time index t_max at which $|Y(n,t)|_{max}$ occurs to determine the time of arrival of an arriving wavefront; and wherein the analyzer uses the a frequency index n_max at which $|Y(n,t)|_{max}$ to determine the doppler shift.

11. The apparatus of 7, wherein the correlator output comprises $Y(n,t)$, and wherein the analyzer determines a maximum absolute value $|Y(n,t)|_{max}$, wherein the analyzer obtains an amplitude for an arriving wavefront by dividing $|Y(n,t)|_{max}$ by a number of sets of pilot data in the series.

12. The apparatus of claim 1, wherein each of the sets of pilot data is represented by a pilot set index, and wherein the joint searcher and channel estimator comprises:

an antenna signal matrix in which a complex value indicative of the signal received in a sampling window is stored as a function of a sampling window time index and the pilot set index;

a parametric estimator which uses complex values in the antenna matrix to generate a parametric output estimation vector

an analyzer which uses the parametric output estimation vector to generate the time of arrival and the channel coefficient.

13. The apparatus of claim 12, wherein each frequency parameter in the parameter estimation vector corresponds to a possible doppler shift.

14. The apparatus of claim 12, wherein the parametric output estimation vector has a sampling window time index and wherein the analyzer uses absolute values of elements of the parametric output estimation vector to determine the time of arrival and doppler shift of an arriving wavefront.

15. The apparatus of claim 14, wherein the parametric output estimation vector has a sampling window time index and a frequency index; and wherein for an element of the parametric output estimation vector having a sufficiently high absolute value the analyzer uses the sampling window time index for an element of the parametric output estimation vector having a sufficiently high absolute value to determine the time of arrival of the arriving wavefront.

16. A method of operating a wireless communication receiver comprising:

obtaining from an antenna element signals for each of successive sets of pilot data;

concurrently using the signals for each of successive sets of pilot data for determining both a time of arrival and channel coefficient.

17. The method of claim 16, wherein the time of arrival and the channel coefficient are essentially concurrently determined by the joint searcher and channel estimator.

18. The method of claim 16, further comprising applying the channel coefficient and time of arrival to a detector to obtain a symbol estimate.

19. The method of claim 16, wherein the step of concurrently using the plural signals for determining both the time of arrival and the channel coefficient is performed by a joint searcher and channel estimator situated in a mobile terminal.

20. The method of claim 16, wherein the step of concurrently using the plural signals for determining both the time of arrival and the channel coefficient is performed by a joint searcher and channel estimator situated in a network node.

21. The method of claim 16, wherein each of the sets of pilot data is represented by a pilot set index, wherein the step of concurrently using the plural signals for determining both the time of arrival and the channel coefficient is performed by a joint searcher and channel estimator, and further comprising the steps of the joint searcher and channel estimator:

storing a complex value indicative of the signal received in a sampling window an antenna signal matrix as a function of a sampling window time index and the pilot set index;

performing a Fast Fourier Transformation (FFT) calculation to generate a correlator output;

using the correlator output to generate the time of arrival and the channel coefficient.

22. The method of claim 21, wherein in performing the calculation the correlator considers

a dimensional receptivity vector formed from the antenna signal matrix with respect to a sampling window time index for the plural sets of pilot data, the dimensional receptivity vector having a frequency related to a difference between phase components of complex values of the dimensional receptivity vector, there being plural possible frequencies for the dimensional receptivity vector, the plural possible frequencies being represented by a frequency index; and

wherein for each combination of plural possible doppler frequencies and plural time indexes, the correlator calculates:

$Y(n,t) = FFT(n,X(:,t))$

wherein t is the sampling window time index;

$X(:,t)$ is the complex antenna matrix; and

n is the doppler frequency index.

23. The method of claim 22, wherein for each combination of plural possible frequencies and plural time indexes, the method comprises evaluating the following expression:

$Y(n,t) = \Sigma\ C_j\ {*}FFT(n,X(:,t)),\ j = 1,K$

wherein C_j is a coding sequence symbol value j and K is the length of the coding sequence.

24. The method of claim 22, wherein the correlator output comprises Y(n,t), and further comprising determining a maximum absolute value $|Y(n,t)|_{max}$.

25. The method of 24, further comprising:

using a sampling window time index t_max at which $|Y(n,t)|_{max}$ occurs to determine the time of arrival of an arriving wavefront; and

using the doppler frequency index n_max at which $|Y(n,t)|_{max}$ to determine the doppler shift direction.

26. The method of 24, further comprising obtaining an amplitude for the arriving wavefront by dividing $|Y(n,t)|_{max}$ by a number of sets of pilot data in the series.

27. The method of claim 16, wherein each of the sets of pilot data is represented by a pilot set index, and wherein the method further comprises:

storing, in an antenna signal matrix, a complex value indicative of the signal received in a sampling window as a function of a sampling window time index and the pilot set index;

forming a parametric estimate using complex values in the antenna matrix and generating a parametric output estimation vector ;

using the parametric output estimation vector to generate the time of arrival and the channel coefficient.

28. The method of claim 27, wherein each frequency parameter corresponds to a possible doppler shift frequency.

29. The method of claim 27, wherein the parametric output estimation vector has a sampling window time index and further comprising using absolute values of

elements of the parametric output estimation vector to determine the time of arrival and doppler shift frequency of the arriving wavefront.

30. The method of claim 29, wherein the parametric output estimation vector has a sampling window time index and a direction index; and wherein for an element of the parametric output estimation vector having a sufficiently high absolute value, the method further comprises using the sampling window time index for an element of the parametric output estimation vector having a sufficiently high absolute value to determine the time of arrival of the arriving wavefront.